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09/813,430	03/20/2001	Zezhang Hou	AUD1P006	3503

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EXAMINER	
MICHALSKI, JUSTIN I	

ART UNIT	PAPER NUMBER
2644	8

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/813,430	HOU, ZEZHANG	
	Examiner	Art Unit	
	Justin Michalski	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 8, 19-22, 25-27, 30-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Matouk et al. (Hereinafter "Matouk") (US Patent 5,625,684).

Regarding Claim 1, Matouk discloses a directional sound processing system (Figure 3), comprising: at least first and second microphones spaced apart by a distance (microphones 36 and 41), said first microphone producing a first electronic sound signal and said second microphone producing a second electronic sound signal; a noise level estimate circuit (52) operatively coupled to said first or second microphone, said noise level estimate circuit operates to produce a noise level estimate associated with the first or second electronic sound signal from said first or second microphone; and a directional circuit (circuit 52, 56, and 57) operatively connected to said first and second microphones and said noise level estimate circuit said directional processing circuit operates to activate or deactivate directional processing with respect to the first and second electronic sound signals based on the noise level estimate (Matouk discloses operation while within a desired threshold level (i.e. activates or deactivate) (Column 3, lines 43-52).

Regarding Claim 2, Matouk further discloses the noise level estimate is less than a threshold amount, said directional processing circuit deactivates the directional processing (Matouk discloses processing until below a desired threshold level (i.e. deactivate) (Column 3, lines 43-52).

Regarding Claim 3, Matouk further discloses wherein when the noise level estimate is less than a first threshold amount, said directional processing circuit deactivates the directional processing, and wherein when the noise level estimate is greater than a second threshold amount, said directional processing circuit activates the directional processing (Matouk discloses correction when signal is below a desired threshold) (i.e. deactivated when noise is below a desired threshold) (Column 3, lines 43-52).

Regarding Claim 4, Matouk further discloses wherein the second threshold amount is greater than the first threshold amount, and wherein when the noise level estimate is between the first threshold amount and the second threshold amount, said directional processing circuit does not change the activation or deactivation of the directional processing from its previous state (Matouk discloses activation when noise is above a desired threshold (i.e. first threshold) and disabled when noise is below a desired threshold (i.e. second threshold) (Column 3, lines 43-52).

Regarding Claim 5, Matouk further discloses a directional processing control circuit (circuit 52, 56, and 57) operatively coupled to said noise level estimate circuit (52), said directional processing control circuit produces control signal (57) based on the noise level estimate and at least one threshold; and a signal modification circuit (56)

operatively connected to said directional processing control circuit, said signal modification circuit operates to modify the second electronic sound signal in accordance with the control signal (Column 3, lines 43-52).

Regarding Claim 6, Matouk further discloses a combining circuit (52) operatively connected to said signal modification circuit (56) and said first microphone (36), said combining circuit operates to produce and output signal by combining the modified second electronic sound signal with the first electronic sound signals.

Regarding Claim 8, Matouk further discloses wherein the control signal (57) is a scaling signal (Matouk discloses that signal 57 is supplied so a correction can be made (i.e. scaling)) (Column 3, lines 45-46), and wherein said signal modification circuit is a multiplication circuit that multiplies the second electronic sound signal with the control signal (multipliers are characteristically and inherently included in adaptive filters (56)).

Regarding Claim 19, Matouk discloses in a hearing aid device having a multi-microphone sound processing device, a method for dynamically controlling directional processing in the multi-microphone sound processing system (Figure 3), said method comprising: (a) receiving first and second electronic sound signals from first and second microphones (36 and 41), respectively; (b) producing a different electronic sound signal based on the first and second sound signals when an estimated noise level is greater than a first threshold; and (c) alternatively producing a non-differential sound signal based on the first and second sound signals when the estimated noise level is less than a second threshold (Matouk discloses activation when noise is above a desired

threshold (i.e. first threshold) and disabled when noise is below a desired threshold (i.e. second threshold) (Column 3, lines 43-52).

Regarding Claim 20, Matouk further discloses the first threshold is greater than or equal to the second threshold (Matouk discloses the threshold level being equal to the second threshold) (Column 3, lines 50-52).

Regarding Claim 21, Matouk further discloses the first and second microphones (36 and 41) are provided within a hearing aid device, and wherein said method is performed by the hearing aid device (Matouk discloses for use to suppress environmental noise (i.e. hearing aid) (Column 1, lines 7-9).

Regarding Claim 22, Matouk discloses a method for dynamically controlling directional processing in the multi-microphone sound processing system, said method comprising: (a) receiving first and second electronic sound signals from first and second microphones (microphones 36 band 41), respectively; (b) estimating a noise level (via 52) picked up by at least one of the first and second microphones, and (c) dynamically controlling the directional processing (via 56) based on the estimated noise level.

Regarding Claim 25, Matouk further discloses controlling (c) comprises scaling one of the first and second electronic sound signals processing in accordance with the directional processing control signal (Matouk discloses that control signal 57 is supplied so a correction can be made (i.e. scaling)) (Column 3, lines 45-46).

Regarding Claim 26, Matouk further discloses controlling (c) comprises: (c1) comparing the estimated noise level to a first threshold level to produce a first comparison signal (via 56); (c2) comparing the estimated noise level to a second

threshold level to produce a second comparison signal, the second threshold level being greater than the first threshold level (via 56); (c3) deactivating the directional processing when the estimated noise level is below the first threshold level; and (c4) activating the directional processing when the estimated noise level is greater than the second threshold level (Matouk discloses activation when noise is above a desired threshold (i.e. first threshold) and disabled when noise is below a desired threshold (i.e. second threshold) (Column 3, lines 43-52).

Regarding Claim 27, Matouk further discloses the second threshold level is greater than the first threshold level (Matouk discloses activation when noise is above a desired threshold (i.e. second threshold) and disabled when noise is below a desired threshold (i.e. first threshold) (Column 3, lines 43-52).

3. Claims 1, 5-7, 9, 11, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Christensen et al. (Hereinafter "Christensen") (US Patent 4,131,760).

Regarding Claim 1, Christensen discloses a directional sound processing system (Figure 1), comprising: at least first and second microphones spaced apart by a distance (101,110), said first microphone producing a first electronic sound signal and said second microphone producing a second electronic sound signal; a noise level estimate circuit (141) operatively coupled to said first or second microphone, said noise level estimate circuit operates to produce a noise level estimate (signal from 143 to 114) associated with the first or second electronic sound signal from said first or second microphone; and a directional circuit (141, 143, and 114) operatively connected to said

first and second microphones and said noise level estimate circuit said directional processing circuit operates to activate or deactivate directional processing with respect to the first and second electronic sound signals based on the noise level estimate.

Regarding Claim 5, Christensen further discloses a directional processing control circuit (141, 143, and 114) operatively coupled to said noise level estimate circuit (141), said directional processing control circuit produces control signal based on the noise level estimate and at least one threshold; and a signal modification circuit (114) operatively connected to said directional processing control circuit (143), said signal modification circuit operates to modify the second electronic sound signal in accordance with the control signal.

Regarding Claim 6, Christensen further discloses a combining circuit (107) operatively connected to said signal modification circuit (114) and said first microphone (101), said combining circuit operates to produce and output (117) signal by combining the modified second electronic sound signal with the first electronic sound signals.

Regarding Claim 7, Christensen further discloses a delay circuit that delays the second electronic sound signal or the modified second electronic sound signal by a delay amount (delay circuit 114).

Regarding Claim 9, Christensen further discloses the control signal is one of a logical "1" and a logical "0" (logic circuit 121 column 3, line 52).

Regarding Claim 11, Christensen further discloses a delay circuit that delays the second electronic sound signal by a delay amount (delay circuit 114).

Regarding Claim 14, Christensen further discloses said directional sound processing system resides within a hearing aid device (Christensen discloses for use in an audio system, i.e. hearing aid) (Column 1, line 8).

4. Claims 15-19, 22-24, 28, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Castello Da Costa et al. (Hereinafter "Castello") (US Patent 5,740,256).

Regarding Claim 15, Castello discloses a directional sound processing system (Figure 1), comprising: at least first and second microphones spaced apart by a distance (microphones 21 and 22), said first microphone producing a first electronic sound signal and said second microphone producing a second electronic sound signal; a minimum estimate circuit (23, ys,i) (Column 5, line 13) operatively coupled to said first or second microphone, said minimum estimate circuit produces a minimum estimate for the first or second electronic sound signal from said first or second microphone; a directional processing control circuit (24) operatively coupled to said minimum estimate circuit, said directional processing control circuit produces a control signal (xi) based on the minimum estimate; and a scaling circuit (5) operatively connected to said directional processing control circuit, said scaling circuit operates to scale the second electronic sound signal in accordance with the control signal; and a subtraction circuit (10) operatively connected to said scaling circuit and said first microphone, said subtraction circuit producing an output difference signal by subtracting the scaled second electronic sound signal from the first electronic sound signal.

Regarding Claim 16, Castello further discloses a delay circuit that delays the second electronic sound signal or the scaled second electronic sound signal by a delay amount (delay circuit 28 and 13).

Regarding Claim 17, Castello further discloses scaling circuit comprises a multiplier (Delay circuit includes filter 13 which inherently and characteristically include multipliers).

Regarding Claim 18, Castello further discloses directional sound processing system resides within a hearing aid device (Castello discloses use in a hands-free communication system (i.e. hearing aid) (Column 1, lines 24-29).

Regarding Claim 19, Castello further discloses in a hearing aid device having a multi-microphone sound processing device (Figure 1), a method for dynamically controlling directional processing in the multi-microphone sound processing system, said method comprising: (a) receiving first and second electronic sound signals from first and second microphones (21 and 22), respectively; (b) producing a different electronic sound signal based on the first and second sound signals when an estimated noise level is greater than a first threshold (adaptive filter 13 changes output based on varying values of input signals (i.e. different values for varying levels (thresholds); and (c) alternatively producing a non-differential sound signal based on the first and second sound signals when the estimated noise level is less than a second threshold (i.e. if no noise is present no canceling will take place).

Regarding Claim 22, Castello discloses a method for dynamically controlling directional processing in the multi-microphone sound processing system, said method

comprising: (a) receiving first and second electronic sound signals from first and second microphones (microphones 21 and 22), respectively; (b) estimating a noise level picked up by at least one of the first and second microphones (signal estimate is disclosed Column 5, lines 26-27), and (c) dynamically controlling the directional processing based on the estimated noise level (Figure 1).

Regarding Claim 23, Castello further discloses controlling (c) comprises: (c1) comparing the estimated noise level to at least one threshold level to produce a directional processing control signal; and (c2) controlling the directional processing in accordance with the directional processing control signal (Castello teaches comparing (7) the estimated noise level (ys,i) to at least one threshold level (ysb,i); and controlling (5) the direction processing).

Regarding Claim 24, Castello further discloses (c2) comprises; scaling one of the first and second electronic sound signals processing in accordance with the directional processing control signal (Castello discloses scaling (5) one of the first or second sound signals in accordance with the directional processing control signal).

Regarding Claim 28, Castello further discloses the first and second microphone are provided within a hearing aid device, and wherein said method is performed by the hearing aid device (Castello discloses use in a hands-free communication system (i.e. hearing aid) (Column 1, lines 24-29).

Regarding Claim 29, Castello further discloses the noise level is estimated by a minimum estimator (Castello discloses a noise estimator) (Column 1, lines 39-40).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 10, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christensen.

Regarding Claim 10, Christensen discloses a system as stated apropos of claim 6 above but does not teach a subtraction circuit. However, it is well known in the art that subtraction circuits may be substituted to perform mathematical operations. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute an adder or subtracter, for the logic circuit of Christensen thereby providing a control signal to the adjustable delay element for the purpose of enhancing the directional characteristics of the sound processing system.

Regarding Claim 12, Christensen discloses a system as stated apropos of claim 1 including a directional processing circuit, said directional processing control circuit operates to produce a control signal based on the noise level estimate and at least one threshold; and a scaling circuit operatively connected to said directional processing control circuit, said scaling circuit operates to scale the second electronic sound signal in accordance with the control signal. Christensen does not disclose a subtraction circuit. However, it is well known in the art that subtraction circuits may be substituted to perform mathematical operations. Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to substitute an adder or subtracter, for the logic circuit of Christensen thereby providing a control signal to the adjustable delay element for the purpose of enhancing the directional characteristics of the sound processing system.

Regarding Claim 13, Christensen further discloses a delay circuit (delay circuit 114) that delays the second electronic sound signal or the scaled second electronic sound signal by a delay amount.

Response to Arguments

7. Applicant's arguments filed 10 May 2004 have been fully considered but they are not persuasive.

Applicant argues pages 8 and 9 regarding claims 1, 19, 22, and dependent claims 2-6, 20, 21, and 23-29 over Matouk. The applicant argues that the Matouk. reference has nothing to do with directional sound processing. The Office respectively disagrees. Matouk clearly discloses the use of the system for directional sound processing. Matouk states that, "...the system of the present invention is for use by a caller and a recipient for suppressing environmental noises in the vicinity of a telephone handset of the caller having a ***directional voice sensor*** for picking up human sounds..." (emphasis added) (Col. 1, lines 54-60). Matouk further discloses that sensor 36 is positioned so that it is substantially directional (Col. 2, line 35). Therefore, the circuit in figure 3 processes the directional sound received from sensor 36.

Applicant argues pages 10 and 11 regarding claims 1, 5-7, 9, 11, and 14 over Christensen. The applicant argues that the Christensen reference is used in the context of reducing echo and reverberation distortion, not to activate or deactivate directional processing based on a noise level estimate (page 10, lines 19-22). The Office respectively disagrees. Christensen states that the direct path signals of all microphones will add in phase, but echo signals from different directions will not be in phase (Col. 7 lines 44-49) and variable sound direction causing echos (Col. 1, lines 25-33). Although it is true that Christensen reduces echo and reverberation distortion, Christensen also corrects for signals from different and variable sound directions to reduce echo from different directions. Christensen is therefore a directional processing circuit in order to reduce sound from different directions.

Applicant argues pages 11 and 12 regarding claims 15-19, 22-24, and 29 over Castello da Costa. The office respectively disagrees.

First, the applicant argues that Castello da Costa does not disclose a minimum estimate signal (page 11, lines 17-20). As stated in the rejection Castello da Costa discloses signal $y_{s,l}$; which is a signal estimate as disclosed on Col. 5, line 13; is produced by circuit 23.

Second, the applicant argues that Castello da Costa does not disclose a directional processing control circuit that produces a control signal based on the minimum estimate provided by the minimum estimate circuit. Castello da Costa discloses a directional processing control circuit 24 which continues produces signal x_i

(i.e. control signal) based on the minimum estimate $y_{s,l}$ provided by the minimum estimate circuit 23.

The applicant further argues (page 11, lines 21-32) that Castello Da Costa does not disclose a scaling circuit. Castello da Costa discloses adaptive filter 5 which inherently will multiply and change the value of the signal (i.e. scale).

Castello da Costa further discloses that a cluster of directional microphones are used (i.e. directional sound processing).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JIM

XU MEI
PRIMARY EXAMINER